

## Reply to Letter to the Editor

### The Cam-type Deformity of the Proximal Femur Arises in Childhood in Response to Vigorous Sporting Activity

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We thank Drs. Ng and Ellis for their well-taken comments to our article “The Cam-type Deformity of the Proximal Femur Arises in Childhood in Response to Vigorous Sporting Activity” [3]. We agree with their comment that although there is an exponentially increasing number of varied treatment methods in recent years, little is known regarding the etiology of cam-type morphology. In the past, cam-type morphologic features were presumed to arise primarily from a mild or silent capital slip [1, 5]. However, the typical horizontal orientation of the growth plate with extension of the epiphysis onto the neck [4] contradicts this hypothesis in the majority of patients with cam-type impingement. To the best of our knowledge, our study showed for the first time that high-level sports activities (basketball) during childhood and early adolescence might be one important factor determining the final shape of the proximal femur in Caucasians. That means that playing basketball at a high level by this age group

represents a risk for the development of a cam-type deformity. Our study however does not provide any confirmation for the hypothesis of Ng and Ellis [2] that high axial loading of the hip is the driving factor in the elite basketball player. Our study simply describes morphologic findings and differences between highly active athletes and a control group during and shortly after the growth period. In contrast to the suspicion of Ng and Ellis that adolescent activities, particularly in flexion-internal rotation, might protect against cam morphologic features, we rather suspect hip activities with vigorous loading during flexion and internal rotation of the hip might be responsible for abnormal growth and an aspherically shaped femur. However it was beyond the scope of our study to define the actual forces and specific damage mechanism leading to cam-type morphology.

#### References

1. Goodman DA, Feighan JE, Smith AD, Latimer B, Buly RL, Cooperman DR. Subclinical slipped capital femoral epiphysis: relationship of the hip. *J Bone Joint Surg Br.* 1997;83:1119–1124.
2. Ng VY, Ellis TJ. More than just a bump: cam-type femoroacetabular impingement and the evolution of the femoral neck. *Hip Int.* 2011;21:1–8.
3. Siebenrock KA, Ferner F, Noble PC, Santore RF, Werlen S, Mamisch TC. The Cam-type deformity of the proximal femur arises in childhood in response to vigorous sporting activity. *Clin Orthop Relat Res.* 2011 Jul 15. [Epub ahead of print].
4. Siebenrock KA, Wahab KH, Werlen S, Kahlhor M, Leunig, Ganz R. Abnormal extension of the femoral head epiphysis as a cause of cam impingement. *Clin Orthop Relat Res.* 2004;418:54–60.
5. Stulberg SD, Cordell LD, Harris WH, Ramsey OL, MacEwen GD. Unrecognized childhood disease: a major cause of idiopathic osteoarthritis of the hip. In: Amstutz HC, ed. *The Hip: Proceedings of the Third Open Scientific Meeting of the Hip Society.* St Louis, MO: CV Mosby; 1975:212–228.

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